LETTERS TO THE EDITOR.

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The University of London Election.

As a graduate of the University in two of its faculties, and as one who has spent a quarter of a century of the best years of his life in the work of scientific education, I may be allowed to feel that I am voicing the higher intelligence of the University in venturing to thank you for putting the present issue so clearly before the constituency in your article in NATURE of January 25.

I look upon all reference to the internal economy of the University in estimating the claims of the respective candidates as so much mere electioneering "dribbling." That work, which has excited so much controversy the last twenty years or so, has produced its happy result, and we may say well of all those controversial matters, "let the dead past bury its dead."

Strange it is that even such a constituency should so far exhibit the inherent stolidness of John Bull as to be unable to face about and view things in their real and ghastly proportion, when all the civilised world is amazed at the spectacle of an invasion of the Queen's Empire (by a race of more primitive civilisation), and the debility of the Empire, with all its wealth and resources, to stem the tide of invasion for weeks and weeks, simply because *science* has been called in to utilise and direct the energies of the enemy.

Looking at the history of the University of London, as constituting one chief factor of the intellectual progress of the Victorian Age, showing even to the "ancient universities" the way to bring scientific studies to the forefront in the academical world, there is no constituency in the country that can speak, and ought to speak, with greater emphasis at this critical stage of our Imperial existence. But it must find (and has, I believe, found in Sir Michael Foster) the man with the tongue of the learned, who can efficiently voice the mind of the University, if it is to cause to ring through Parliament to each remote corner of the Empire the question (which every loyal subject of the Queen is trying to ask), whether in the future the interests and the safety of the English race are to be entrusted to a military system with an *empirical basis* (which snubs scientific studies and drives them into a corner) as in the past, or to a rejuvenised system with a *scientific basis*, such as Germany presents to the world.

A. IRVING.

Floating Stones.

IN reference to Dr. Nordenskiold's communication *re* "Floating Stones" (No. 1577, vol. lxi.), it is a common thing to see grains of sand and small shells floating upon the waters of seas and estuaries, &c., when the surfaces are unagitated. The sand-grains must be dry; they are, therefore, only lifted and floated off by a rising tide after exposure to dry air.

In this way material is being constantly conveyed from one place to another during the *flow* of the tide, and does not return with the ebb.

The grains float as patches composed of fine and coarse material clinging together; the presence of the very fine grains appears to facilitate the flotation of the larger grains and shells. The phenomenon is more frequently seen where shell-sands occur, and is, I suppose, due to surface-tension.

If a few grains of dry sand be placed separately on various parts of a water-surface, they will eventually unite to form a patch; if this experiment be conducted carefully, the surface of the water can be completely covered by sand before any sinks to the bottom of the vessel. The tenacity of a large patch is remarkable; when once formed the vessel may be considerably agitated, and the patch even pressed down by the finger, without the grains becoming disunited.

London, January 24. CECIL CARUS-WILSON.

I AM interested in an article headed "Floating Stones" in your number of January 18, for I have observed the same phenomenon nearer home, namely, at Kimmeridge, where the flaky nature of the beach material renders the appearance of floating stones very common.

The only conditions necessary are a very gently rising tide after a dry day, during which the small flakes of "Kimmeridge clay" have had time to dry thoroughly.

If some of these dry flakes are on a very gently sloping surface of rock, or on top of a smooth stone, or any position where the water can rise and surround the flake gently (of course, this is below the shingle belt, for at the shingle the water is too broken), then the flake rises with the water, and floats away just as a needle will on the surface of water; a few bubbles may cling to the under-surface occasionally, and would, when present, assist the floating.

Since reading the article I have tried pieces of broken roof slate, and I have found that a small piece of dried slate about 1·5 × ·75 cms. by about 1 cm. floats easily on tap water when gently placed on the surface. R. C. T. EVANS.

9, Heathcote-street, Gray's Inn-road, W.C., January 29.

THE GERMAN ANTARCTIC EXPEDITION.[1]

THE German Antarctic Expedition will leave Europe, in a single ship, in the autumn of 1901. The simultaneous dispatch of a second ship is not proposed, as this does not appear to be necessary, either for the solution of the scientific problems or for the safety of the Expedition. A second vessel would be expedient only if it were intended to carry out oceanographical researches around the Antarctic area at the same time as a southward advance is made by the first ship. This is rendered the less necessary, on account of the work which has been done by the German Deep Sea Expedition in Antarctic waters south of the Indian Ocean, the side on which the German Expedition will endeavour to penetrate the ice.

The designs for the Antarctic ship have been completed with the advice of the Construction Department of the Imperial Navy. The building of the ship has been undertaken by the Howaldt works in Kiel, which, in response to the circular inviting estimates, worked out an admirable plan. In designing the vessel special attention has been paid to seaworthiness, on account of the severe storms and high seas which prevail in the Southern Ocean; and, of course, she will be made as strong for ice-navigation as it is possible to build her. The necessary strength will be secured by a system of internal supports and a triple planking of oak, pitch-pine and green-heart. The hull will not be so much rounded as in the case of the *Fram*, such a cross-section appearing unsuitable for a ship which will have to encounter heavy seas, and the necessary resistance to ice pressure may be obtained with a somewhat fuller form. It need not be said that the vessel will be built entirely of wood. She will be rigged as a three-masted top-sail schooner, and will be provided with an engine and two boilers of power sufficient to ensure a speed of seven knots and more if necessary.

The dimensions of the ship have been decided upon after taking account of the number of the scientific staff, officers and crew who will be carried, as well as the time which the Expedition is expected to be absent. The scientific staff will be five in number, and there will be five officers, including the first engineer, and eighteen to twenty men. The Expedition is expected to be absent for two years, but it will be equipped for three in case it should be found necessary to prolong it. These requirements demand a length of 151 feet, and a depth of about 16 feet below the water-line. The cost of building the ship will be about 30,000*l*.

The scientific staff of five, including the doctor, will be so chosen that each important branch of science will be represented. Each member of the staff will be able himself to carry out all the work of his own department; but every one will be capable of assisting in the special work of any other, or if necessary of taking his place.

[1] Translated from Prof. von Drygalski's MS. by Dr. H. R. Mill.

The author of this article, who has been appointed leader of the Expedition, will undertake the physico-geographical, oceanographical and geodetic work; Dr. E. Philippi, of Breslau, will take charge of the geological, palæontological and chemical investigations; Dr. E. Vanhöffen, of Kiel, will act as zoologist and botanist; Dr. H. Gazert, of Munich, will be the surgeon; and the fifth member of the staff, who will have charge of the magnetic and meteorological observations, is not yet selected.

The five officers, including the captain and the first engineer, will be fully occupied with their duties in the management and navigation of the ship during the voyage. But during the year to be passed at the scientific station which will be founded by the Expedition, and near which the ship will remain, the officers will take such part in the scientific work as may be decided at the place and time by the leader of the Expedition. They will probably be occupied principally with astronomical observations at the station, topographical and hydrographical surveys in its neighbourhood, and with pendulum and magnetic observations on the land-journeys and at the station. The crew also, the amount of whose assistance to the scientific staff during the voyage must be regulated by their duties on the vessel, will be allocated, at the winter quarters, to the different members of the scientific staff for training, so that they will become able to lend a hand on occasion. The captain, officers and crew have not yet been appointed.

As indicated above, the work of the Expedition may be divided into two parts; one carried out on board during the voyage, the other on shore at the winter quarters. The projected route of the Expedition is of importance with regard to the first part. It is intended to enter the Antarctic from the direction of Kerguelen, and the details of the route, particularly the deviations from a straight course, are planned with regard to oceanographical, geological and magnetic requirements. The oceanographical considerations are the existing lacunæ in our knowledge of the depths of the sea; the geological are the collection from various island groups of specimens for comparison with those obtained in the Antarctic; the magnetic conditions make it desirable to cut the lines of equal value of the various magnetic elements in as many points as possible. Taking all these conditions into account, I propose not to run directly south from Kerguelen, but first to sail eastwards to about 90° E., and then turn towards the south, as on that meridian deep-sea soundings are wanting. For the same reason the route from Cape Town to Kerguelen would be curved southward between Prince Edward and Crozet Islands, while, on the other hand, on the return voyage the line between South Georgia and Tristan da Cunha will be straight, because it is desirable to investigate the southern extension of the great Atlantic rise.

The point which the German Expedition has in view for commencing the penetration of the Antarctic region is the still hypothetical Termination Island. The British Expedition being intended to follow the northern side of Wilkes Land, the east coast of Victoria Land, the great ice wall, and beyond that to investigate the Pacific side of the Antarctic, the German Expedition is planned to strike southwards from Termination Island in order to discover the western side of Victoria Land, and to clear up its possible connection with Kemp Land and Enderby Land, and ultimately to sail round the Atlantic side of the Antarctic and investigate, wherever it may be possible, the southern extension of the Atlantic Ocean and Weddell Sea. If the two expeditions carry out this common plan, the geographical division of the work gives the best basis for co-operation in all other questions.

The second part of the German programme is the establishment of a scientific station in the Antarctic, at which a full year will be spent in geographical and biological work, and which will serve as a starting-point for longer or shorter land-journeys. It is, of course, impossible to say where this station will be, as the site must depend on the results of the discoveries made in pushing southwards. An effort will be made to establish it on the west side of Victoria Land, where one may expect to find an extensive land surface which will offer a favourable opportunity for carrying on the various researches; such a position would be particularly desirable for magnetic observations, on account of its proximity to the south magnetic pole.

The great Antarctic ice-cap could probably be best reached and explored on an extensive land which might perhaps enable one to travel towards the South Pole itself. An extensive land also offers richer opportunities for the study of plant and animal life, if such exist, and also for geological phenomena, than separate islands; and observations on gravity also are of more value on a large land surface. Briefly, an effort must be made to build the German station on the coast of an extensive land, and for this purpose the west coast of Victoria Land appears the most suitable, as it is the intention of the British Expedition to land some of their party on the eastern coast, and this proximity will afford an opportunity for effective co-operation.

I can naturally only refer briefly to the particulars of the projected expedition, the main plan of which has been sketched above. The fundamental fact is that the scientific preparation will be so complete that every kind of work can be carried out which the present condition of science requires, and for which time and opportunity offer. What will actually be done must naturally be decided on the spot. The members of the Expedition must be so prepared that they can distinguish the important from the less important, the necessary from the merely desirable; in a word, the purely Antarctic, if one may so say, from what could be carried out equally well in other parts of the world. The desiderata of Antarctic exploration are innumerable. It is essential to make a proper choice, and this is the first object to be served by thorough preparation.

For this purpose general instructions likely to be of service will naturally be subject to the initiative of the investigators themselves when they arrive at the field of work.

I shall here only mention a few of the problems with which the German Expedition will be occupied. Amongst these, geographical studies will take the first place, since they supply the necessary foundation for all other investigations. An effort will be made, not only to lay down the coast-lines, but, in some places at least, to follow out the general contour and, wherever it is possible, to study the forms of the land. The ice which gives its special character to the Polar regions will be studied as regards its nature and structure, its temperature, its transport of land-waste, and its movement, and this should permit conclusions to be drawn as to the land which it covers. With regard to the sea, soundings will be made in the regions where they are still wanting along the intended route—that is, in the whole area south of 40° S. and in some places also to the north of that parallel. It has already been pointed out that the route has been chosen with special regard to the regions where soundings are most required. Of course, observations will be made at the same time on the physical conditions of the sea with regard to temperature, density, composition of the water and the deposits, colour, dissolved gases, and circulation. It would be of great value also if pendulum observations could be carried out during the voyage, as it is intended to make this a special feature of the work on shore, and particularly in the neighbourhood of the station.

The geologist's duties will include the study of the samples of deep-sea deposits brought up by the sounding-rod, and also the chemical investigation of the sea-water, the physical properties of which will be studied by the geographer. The geologist will, of course, be busily employed at every landing. He will take part in sledge journeys from the land station, along the coast, and occasionally towards the interior. Special attention will be devoted to fossil plants, if such should be found to exist in the far south, as well as to all other palæontological and petrographical questions which are likely to allow comparisons to be made between the South Polar region and the rest of the world.

The Expedition promises a particularly wide field of work to the zoologist and botanist. His prospective collections should include every form which can be preserved or carried on board the ship, and they will apply equally to the fauna and flora of the land, of freshwater lakes, of the littoral zone and of the deep sea. Special attention will be paid to the seasonal differences in the occurrence of the various animal forms, and to their development. Biological investigations will, of course, be carried out in close relation to the physical; in order, for example, to recognise the dependence of plant and animal life on the conditions of the sea-water and the nature of the currents. For this purpose vertical and closing tow-nets have been planned to be used in the different regions, and from the station at different seasons. By comparing the results and those of surface gatherings at the various seasons, data will be obtained for the study of ocean currents. As the Expedition is not primarily intended for deep-sea investigation, it is not proposed to carry on deep-sea observations to a depth greater than 1000 metres. The gear required for dredging at greater depths would be too cumbrous an addition to the necessary equipment of the ship. This limitation is the less serious since the deep-sea fauna in warmer regions reaches up to within 700 metres of the surface, and in cold regions still higher.

The surgeon of the Expedition will, in addition to the treatment of such illness as may arise, endeavour to collect information on Polar hygiene by a careful study of the state of health of the members of the Expedition. These observations should enable him to advise the leader on many questions connected with the arrangements and manner of life of the Expedition. Further physiological studies will also be carried out, and the surgeon will assist the biologists in observations on the development of various organisms, and especially with bacteriological research.

The magnetic and meteorological work of the Expedition, like that of the other departments, will be the sole charge of one member of the staff, but he will be assisted in reading the instruments and in other mechanical work by members of the ship's company, and the officers will co-operate in the various physical observations at the station.

Regular meteorological observations will be taken during the voyage every four hours, if possible, and at the station three times daily. For wind, cloud, and similar phenomena, it will be desirable to organise a system of continual observation of the sky. Self-recording apparatus will be employed for pressure, wind, temperature, humidity and duration of sunshine, and in case these should become ineffective through extreme cold their place will be taken by as many eye-observations as can be managed. Special observations during the cruise will be required for such questions as the time of the daily maxima at sea, the best arrangement for a rain-gauge on board, twilight phenomena in the open sea, water-spouts, &c. At the station it is intended to carry out observations on the upper regions of the atmosphere, but to what extent and in what manner cannot be decided until the balloon equipment is definitely arranged. A captive balloon will certainly be carried for the purpose of geographical reconnaissance; sufficient gas to fill the balloon about ten times, and a lifting power which will make it possible to raise an observer about 500 metres, seem to be all that is necessary. It appears to be better to carry the hydrogen for filling the balloon in compressed form rather than to prepare it on the spot, that is, if compressed gas can be carried safely on board, a point on which further information is necessary.

The programme for magnetic work is not yet definitely settled. Pending the results of further consideration and advice, the following may be looked upon as likely to form part of it. During the voyage the magnetic elements will be determined at least once a day with the standard compass, the Fox apparatus (dip-circle), and perhaps also with the deviation magnetometer. The magnetic apparatus will be installed upon the navigating bridge of the ship, in the neighbourhood of which no iron will be used in the construction. At the station variation observations will be made with photographic registering apparatus, controlled by direct readings. Magnetic observations will also be provided for on the land journeys.

Particular attention will be paid to the study of the *Aurora Australis*, especially with regard to its form and height, perhaps also as to its spectrum, and the coincidence of auroral displays and magnetic disturbances; but the measurement of earth-currents is considered as beyond the scope of the Expedition.

In connection with the arrangements for magnetic work at the station there will be provision made for seismological observations.

Astronomical determinations of latitude and longitude, and geodetic measurements will, of course, be carried out. During the voyage, and on land-journeys, the former will be fixed by means of the prismatic reflecting circle; but at the station, where a more exact astronomical determination is necessary a large transit theodolite, and a good telescope for occultations, will be employed. At the points on the shore connected with the station a smaller universal instrument, or a prismatic circle, will be utilised. Continued time determinations will naturally be carried out in connection with absolute observations for latitude and time conversions; pendulum observations will be made as often as possible. Geographical surveys on the scale of about 1 : 50,000 will be desirable in the neighbourhood of the station, and in such other places as may be interesting from a cartographical point of view, or which present important physical phenomena, such as ice-movement or ice-structure, or where the pendulum observations make a special survey desirable. For this purpose the smaller or even the larger universal instrument will be employed, as well as a Stampfer's level with staves. Opportunities may also occur for the use of photographic surveying instruments. Attention will be given to the anomalous refraction which, from the observations of previous Polar travellers, appears to be due to some atmospheric conditions different from any that occur in our latitudes.

This sketch of the German programme naturally does not exhaust the problems with which we have to deal. It was, however, less my intention to give an account of the work which we hope to attempt than to indicate the directions and lay down the limits of our proposed operations, as that will be of service in finally settling the methods of international co-operation. From this point of view, the large number of the problems mentioned does not appear dangerous. It might, however, become so if the Expedition were tied down to definite instructions, and not left free to act as time and opportunity demand. It seems the wisest course to provide a complete equipment for all branches of scientific work,

opportunities for doing which may offer themselves, and leave it to the leader of the Expedition to decide on the spot and at the time what work will be done.

I have already pointed out that the basis of international co-operation has been laid in the choice of routes and the consequent division of districts within which the land stations are to be established. The German Expedition takes the Indian Ocean and Atlantic side, and the British the Pacific side of the Antarctic area. An expedition from a third side would find a wide and important field of activity to the south of South America. As regards physico-geographical, geological, biological and gravity observations, scarcely any further co-operation is required than the simultaneous carrying out of observations in the different areas. Should the British Expedition include a second ship, it would be possible to carry on biological deep-sea research round the Antarctic area over a much wider circle than we can attempt with one vessel.

A clearer understanding is still required, in my opinion, for co-operation in meteorological and magnetic research, to decide, in the first place, the scope and the methods of research to be pursued during the voyage and during the year's sojourn at the land station; and in the second place, what additional work beyond that undertaken by the two expeditions it may be possible to arrange. My scheme for the first of these plans is already sketched out as far as regards the meteorological work; the magnetic programme requires still further consideration. The understanding with the British Expedition on this question is now under discussion. For both branches of science the choice of routes and of districts in which the stations will be placed is very appropriate, as observations will be made in the vicinity of the south magnetic pole on two sides, and both stations lie in the probable position of the Antarctic anti-cyclone, which appears to extend furthest north on the Indian Ocean side. The second point, which concerns the organisation of simultaneous observations outside the Antarctic area, is still unsettled. The British Antarctic Expedition has already in view the establishment of a scientific station in New Zealand, while Germany is planning a branch station on Kerguelen. These would furnish valuable data for comparison with the results obtained by the expeditions themselves. Yet, we must go further, but not so far, I think, as M. Arctowski suggested in his Paper to the British Association at Dover. It is greatly to be wished that during our expeditions the Observatories of Melbourne and Cape Town would undertake similar observations, and it would also be a good thing if a station could be placed near Cape Horn or in South Georgia, as well as one in the North Polar region, say at Bossekop. Thus the problems of the Antarctic regions could be attacked simultaneously from without and from within.

A resolution of the St. Petersburg Meteorological Congress, in August last, in favour of such co-operation was received with pleasure. The International Geographical Congress at Berlin went further, and unanimously approved the appointment of a committee charged with (1) Laying down the scope and the means of investigation for the magnetic and meteorological work of the expeditions; (2) The organisation of similar series of observations on the expeditions, and perhaps also exerting influence for the establishment of observations at other places.

On the German side, the members of this joint committee are Profs. Hellmann, v. Drygalski, Eschenhagen and A. Schmidt; and on the British side, Dr. R. H. Scott, Dr. Buchan, Prof. Schuster and Capt. Creak. The programme prepared on the German side for the meteorological and magnetic work has already been sent to the British members of the Committee to be considered by them, and afterwards discussed and definitely settled by the whole committee. We may expect in this, as in all other points, a complete and useful co-operation between the two expeditions.

ERICH VON DRYGALSKI.

THE VAN 'T HOFF CELEBRATION AT ROTTERDAM.

ALLUSION has already been made in the columns of NATURE (No. 1575, vol. lxi.) to the celebration of the twenty-fifth anniversary of the doctorate of Prof. van 't Hoff, which took place at Rotterdam on the 22nd of last December. The following further particulars may perhaps be of interest to English readers.

Some eighteen months ago it was decided by a committee of old students that the event should be celebrated in a suitable manner. To this end, in the first place, invitations were sent out to all former students of van 't Hoff, requesting them, if possible, to contribute a paper to a volume to be presented to the savant on his jubilee day. The invitation was responded to most cordially, and before the end of last September some twenty-six papers had been received by the committee. The original intention was to publish these in book form, but, as the result of a later suggestion and the kindness of Prof. Ostwald, the publication took the form of a jubilee volume of the *Zeitschrift für physikalische Chemie.*

The jubilee ceremony itself was held on the date above-mentioned in Rotterdam, the birthplace of van 't

Prof. J. H. van 't Hoff.

Hoff, where by reason of family ties he is usually to be found during the last days of each year. The "Bataavsche Genootschap voor Natuurwetenschappen" had invited a considerable number of Dutch and foreign men of science, as well as all old students of the professor, to a special meeting of the society at 3 o'clock in the afternoon. At the appointed time the hall was crowded with enthusiastic admirers of Holland's great physical chemist, many of whom had travelled far to pay their tribute. Not a few had come from Germany, and in addition Belgium, Switzerland, Austria, Japan and England were represented. Amongst the number present were Profs. Ostwald, Spring, Lobry de Bruyn, Roozeboom, Abegg, Goldschmidt, Hamburger, Hollemann, Lorenz, and Drs. Bredig, E. Cohen, Meyerhoffer, Reicher. Presently, amidst the cheers of the audience, van 't Hoff, supporting